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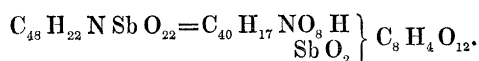
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These numbers correspond to the formula



Theory.				I.	II.
C ₄₈	=	288	.. 46·43	46·46	—
H ₂₂	=	22	.. 3·54	3·76	—
N	=	14	.. 2·25	—	—
Sb	=	120·3	.. 19·39	—	19·85
O ₂₂	=	176	.. 28·37	—	—
		620·3	99·98		

It is very remarkable that corresponding crystalline double tartrates are not obtained by boiling tartar-emetic with many of the other organic bases.

The following have been tried, but unsuccessfully :—

Quinine.	Aniline.
Cinchonine.	Theine.
Cinchonidine.	Piperine.
Furfurine.	

March 26, 1863.

Major-General SABINE, President, in the Chair.

The following communications were read :—

- I. "Researches into the Chemical Constitution of Narcotine, and of its Products of Decomposition."—Part I. By A. MATTHIESSEN, F.R.S., and GEORGE CAREY FOSTER, B.A. Received February 26, 1863.

(Abstract.)

An abstract of a considerable portion of this paper has already appeared in the form of a preliminary notice* of the first results obtained. The most important additional facts now communicated are the following :—

The analysis of five additional specimens of narcotine has confirmed the accuracy of the formula $\text{C}^{22} \text{H}^{23} \text{NO}^7$, which the authors

* Proc. Roy. Soc. vol. xi. p. 55.

adopted for this base in their previous notice. The mean results of all their analyses (ten determinations of carbon and hydrogen and four determinations of nitrogen) give for the composition of narcotine,—

Carbon	63·78
Hydrogen	5·76
Nitrogen	3·32
Oxygen	27·14
	100·00

The formula $C^{22}H^{23}NO^7$ corresponds to

Carbon	63·92
Hydrogen	5·57
Nitrogen	3·39
Oxygen	27·12
	100·00

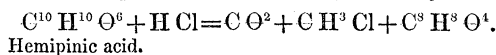
The authors had previously stated that meconin, opianic acid, and hemipinic acid were all decomposed by boiling concentrated hydriodic acid, with evolution of iodide of methyl. They now find that hydrochloric acid acts similarly on these bodies, evolving with each of them chloride of methyl. They suggest the name *hypogallic acid* for the acid $C^7H^6O^4$, formed by the action of hydriodic acid on hemipinic acid*, in order to recall the fact of its containing one atom of oxygen less than gallic acid, $C^7H^6O^5$. They obtained the same product by the prolonged action of hydrochloric acid on hemipinic acid; but by a shorter action an intermediate product was obtained, which, according to a single analysis, appears to contain $C^8H^8O^4$.

	Calculated.		Found.
C^8	96	57·14	56·65
H^8	8	4·76	5·17
O^4	64	38·10	—
$C^8H^8O^4$	168	100·00	

This substance is an acid of much greater stability than hypogallic acid; it crystallizes in long, thin, transparent prisms, which are anhydrous, and are almost insoluble in cold water, slightly soluble in boiling water, but dissolve more readily in alcohol and ether. At

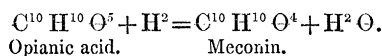
* Proc. Roy. Soc. vol. xi. p. 58.

about 200° C. this acid sublimes unchanged, and it may be heated to 245° without melting or becoming coloured; it dissolves in strong sulphuric acid, and is precipitated unaltered on addition of water. It gives no coloration with sesquichloride of iron; with nitrate of silver it gives a white precipitate which slowly blackens on boiling. Its formation from hemipinic acid may be expressed by the equation



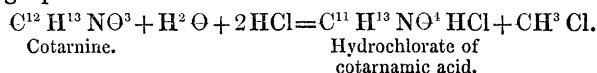
This substance has the composition of methyl-hypogallic acid; but its great stability, as compared with hypogallic acid, makes it appear improbable that such is its true constitution.

Nascent hydrogen evolved from sodium-amalgam and water, or from zinc and dilute sulphuric acid, converts opianic acid into meconin,



Hemipinic acid is unaltered by nascent hydrogen.

Aqueous hydrochloric acid decomposes cotarnine at 140° C. into chloride of methyl, and a substance which the authors call *hydrochlorate of cotarnamic acid* and represent by the formula $\text{C}^{11} \text{H}^{13} \text{NO}^4$, HCl, supposing it to be formed according to the following equation:—



The formula proposed does not agree perfectly with the results of several analyses, which are accordant among themselves, and is given as provisional only.

	Calculated.				Found (mean).
C^{11}	132	....	50·87	....	49·98
H^{14}	14	....	5·40	....	5·70
N	14	....	5·40	....	5·71
O^4	64	....	24·65	....	24·61
Cl	35·5	....	13·68	....	14·00
$\text{C}^{11} \text{H}^{13} \text{NO}^4, \text{HCl}$	259·5	....	100·00	....	100·00

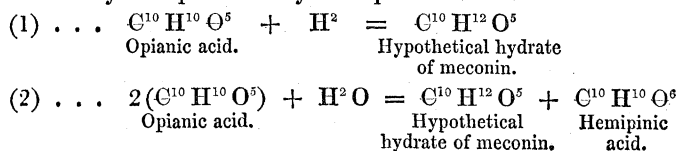
This body crystallizes in small silky needles of a pale yellow colour; it is partially decomposed, losing hydrochloric acid, when dissolved in pure water, but dissolves unchanged in water containing a trace

of free hydrochloric acid. Alkalies, or alkaline carbonates or sulphites, throw down from the aqueous or acid solution an orange-coloured granular precipitate (cotarnamic acid?) free from hydrochloric acid; this precipitate dissolves in excess of alkali, giving a solution which quickly becomes dark brown by exposure to air; with hydrochloric acid, it regenerates the original crystalline compound; it dissolves slightly in water, with a bright orange colour that is visible even in very dilute solutions. The slightly acidulated solution of the hydrochlorate is pale yellow when pure, but acquires a deep-green colour in the air. A few drops of nitric acid added to a hot solution cause it to appear of an opaque crimson colour by reflected light, though the liquid is still transparent when examined by transmitted light. Nitrate of silver added in quantity more than sufficient to precipitate the chlorine is quickly reduced. The compound acquires a fine crimson colour when evaporated nearly to dryness on the water-bath, with a slight excess of dilute sulphuric acid.

Hydriodic and diluted sulphuric acids decompose cotarnine at a high temperature in the same way as hydrochloric acid. The products so formed have not been isolated, but were converted into hydrochlorate of cotarnamic acid.

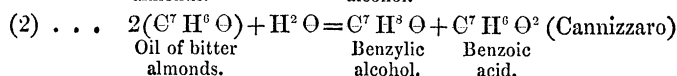
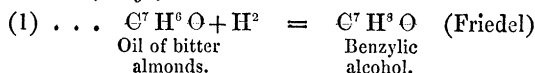
The authors conclude by offering some suggestions towards the interpretation of the results they have obtained. Only the most important points discussed by them will be briefly indicated here.

They suppose that when opianic acid is converted into meconin by the action of nascent hydrogen, or into meconin and hemipinic acid by the action of potash*, a substance containing $C^{10}H^{12}O^5$ may possibly be the immediate product of the reaction, and that this body—bearing the same relation to meconin that glycol, $C^2H^6O^2$, does to oxide of ethylene, C^2H^4O , or mannite, $C^5H^{14}O^6$, to mannitan, $C^5H^{12}O^5$ —may give rise to meconin by subsequent loss of the elements of water. Making this supposition, the two reactions in question may be represented by the equations



* Proc. Roy. Soc. vol. xi. p. 57.

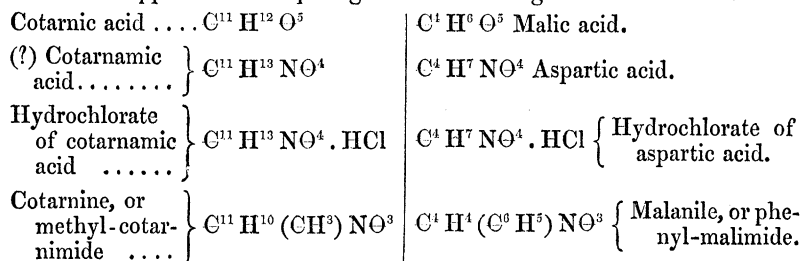
Thus viewed, both transformations appear strictly analogous to the known transformations of oil of bitter almonds and many other substances; *e. g.*,



and may be regarded as supporting the views of Berthelot, who has suggested that opianic acid ought to be classed as an aldehyde rather than as a true acid.

With regard to the constitution of hemipinic acid, the authors suppose that it may be a dimethylized derivative of a bibasic but tetratomic acid, $\text{C}^8 \text{H}^6 \text{O}^6$ (analogous to tartaric acid, $\text{C}^4 \text{H}^6 \text{O}^6$), the two atoms of methyl occupying the places of the two atoms of hydrogen, which, though outside the radical, are incapable of being replaced by metals: hemipinic acid would thus be comparable to Wurtz's ethyllactic acid, the body at one time described by Butlerow as valerolactic acid.

An analogy is further pointed out between the derivatives of malic acid and the substances obtained from cotarnine. This analogy becomes apparent on comparing the two following series of formulæ:—



The authors intend to continue their experiments.

II. Postscript to a Paper read January 15, 1863, "On the Formation of Fibrin from Albumen." By ALFRED HUTCHISON SMEE, Jun. Communicated by ALFRED SMEE, Esq., F.R.S. Received March 2, 1863.

Since the paper was read before the Royal Society the following additional facts have been elicited. Fibrin was obtained from